Justification for Reduction in Commitment

This revision identifies the changes to the significant and bounding hazard evaluations that have occurred since approval of Revision 0 of the Part A HAR (see new Appendix E of the HAR). In some cases, new hazards are identified. Also, the consequences of some hazard evaluations have increased. The RU interprets such changes as a reduction in commitment.

The following paragraphs describe the new or changed significant and bounding hazard evaluations identified to date and provide a qualitative demonstration that adequate safety is not challenged. In all cases, it is judged that the control strategies selected for these new or changed significant and bounding hazards ensure that their potential consequences will satisfy the applicable radiation and chemical exposure standards and will conform with the defense in depth implementing standard (*Safety Requirements Document*, Volume II, Appendix B). Formal, quantitative hazard analysis and justification of selected control strategies will be provided in the Preliminary Safety Analysis Report to be submitted in the Construction Authorization Request.

1. High Air Flow in Pretreatment Feed Receipt Vessels

   This event is initiated by control failure or control valve failure, resulting in high air flow during the drive phase of pulse jet mixer (PJM) within vessels V12001A - F. This "overblow" produces a release of radioactive aerosols into the vessel air space and out via the Process Vessel Ventilation System (PVVS). The hazard severity levels associated with the resulting unmitigated consequences of this release are as follows:

   - Public: SL-3
   - Facility Worker: SL-1
   - Co-located Worker: SL-1.

   This event is prevented by the use of robust controllers, and the pulse jet equipment will be designed to minimize overpressure from high air flow. However, should the hazardous situation occur, the mitigative control strategy for this event is to design and build the PVVS to passively remove aerosols in the exhaust stream and to passively filter the exhaust prior to discharge to the environment so that radiation exposure standards are met.

   It is the judgment of the Integrated Safety Management (ISM) team that the identified controls are adequate to ensure that the resultant mitigated consequences will meet the applicable radiological exposure standards and that defense in depth will be achieved.

2. Hydrogen Explosion in Pretreatment Feed Receipt Vessels

   This event is initiated by loss of pulse jet mixing within vessels V12001A - F for an extended period of time due to events that lead to a loss of air, such as inadvertent valve closure or power loss. Hydrogen and steam then accumulate under the settled solids. Assuming an ignition source is present, the resultant pressure surge or explosion damage the vessel and creates an airborne radioactivity release. The hazard severity levels associated with the resulting unmitigated consequences of this release are as follows:

   - Public: SL-1
   - Facility Worker: SL-1
   - Co-located Worker: SL-1.

   This event is prevented by the use of robust equipment and by the use of backup features (e.g., bottled air supply). However, should the extended loss of normal air supply occur, the control strategy for this event is to provide a standby air pulse generator that can be

connected to the PJM legs to pump air down the legs, thereby mixing the tank contents and preventing layering.

It is the judgment of the ISM team that the identified controls are adequate to ensure that the resultant mitigated consequences will meet the applicable radiological exposure standards and that defense in depth will be achieved.

3. Radioactive Spill in C2 Pump and Valve Gallery

This event is initiated by a failure to properly isolate process flow from a component to be removed, resulting in a spill of radioactive material in the C2 Pump and Valve Gallery. The hazard severity levels associated with the resulting unmitigated consequences of the release of radioactive aerosols are as follows:

- Public: SL-1
- Facility Worker: SL-1
- Co-located Worker: SL-1.

The control strategy for this event relies primarily on the administrative controls taken before flasking operations begin to ensure that safe conditions exist. These administrative controls include the application of "double block and bleed" techniques, where appropriate, independent cross-checks on valve arrangements, and other lockout/tagout procedures. In addition, it is noted that drains on the casing exist that would redirect some of the flow. Also, the flask/gamma gate arrangement provides a confinement function.

It is the judgment of the ISM team that the identified controls are adequate to ensure that the resultant mitigated consequences will meet the applicable radiological exposure standards and that defense in depth will be achieved.

4. Dropped Load in C5 Cell

This event is initiated by a drop of a lifted component onto process lines in the C5 cell below, resulting in breach of the process lines and a liquid release of radioactivity. The dropped component also causes damage to the facility structure (C2 Pump and Valve gallery floor and C5 cell roof). The hazard severity levels associated with the resulting unmitigated consequences of this release are as follows:

- Public: SL-1
- Facility Worker: SL-1
- Co-located Worker: SL-1.

The control strategy for this event relies primarily on the design of the crane hoist, bridge and associated lifting gear that ensure that the frequency of the initiating event is low. In addition, the use of dedicated load paths will ensure that traverses over sensitive equipment in the cell below will be minimized.

It is the judgment of the ISM team that the identified controls are adequate to ensure that the resultant mitigated consequences will meet the applicable radiological exposure standards and that defense in depth will be achieved.

5. Hydrogen Explosion in HLW Concentrate Receipt Tanks

This event involves radiolytic hydrogen generation in the HLW Concentrate Receipt Tanks (V31001/V31002), leading to potential buildup to flammable concentration and detonation/deflagration. The radioactive aerosols ands particulate produced by the explosion

are released to the C5 ventilation exhaust system. The hazard severity levels associated with the resulting unmitigated consequences of this release are as follows:

- Public: SL-3
- Facility Worker: SL-1
- Co-located Worker: SL-1.

The control identified to prevent this event is an active air injection system sufficient to maintain the hydrogen concentration below set levels with an expected failure probability of less than 1E-06. This control protects the Public, Worker and Co-located Worker. This system will be designed to maintain the hydrogen concentration below specified limits for all credible events identified (loss of power, seismic, process upsets). Mitigation of the release of material in the event the primary control fails is provided by the cave/cell structure and C5 ventilation system (filtration and depression).

Active ventilation (normal offgas/process ventilation system) will also provide defense in depth against the buildup of hydrogen in the process vessels. This control is not credited pending calculations to determine if sufficient inleakage exists without an active injection system to maintain the hydrogen concentration below set limits.

It is the judgment of the ISM team that the identified controls are adequate to ensure that the resultant mitigated consequences will meet the applicable radiological exposure standards and that defense in depth will be achieved.

6. Direct Exposure from IHLW Canister

This event is initiated by improper placement of a filled IHLW product canister in the import tunnel due to human error. The hazard in this case is direct radiation dose to the facility workers through an unshielded import hatch or upon entry into the tunnel. The severity levels associated with this event are as follows:

- Public: N/A
- Facility Worker: SL-1
- Co-located Worker: N/A.

The control for this event is to prevent worker access into high radiation areas and to prevent open shield doors when personnel are present.

The Radiation Protection Program will control personnel access into areas with the potential to contain high radiation sources. In addition to the programmatic requirements which must be satisfied to access these areas, a gamma interlock system castell key is used to prevent physical access (by restricting the unlocking and opening of personnel access doors) when a high radiation source is present.

Shield doors are interlocked with the personnel access doors to prevent their opening when the personnel access door is unlocked/opened.

It is the judgment of the ISM team that the identified controls are adequate to ensure that the resultant mitigated consequences will meet the applicable radiological exposure standards and that defense in depth will be achieved.

7. Cask Drop onto Waste Drum

This event is initiated by a cask drop during handling in the cask export area due to equipment malfunction or human error. The cask breach results in waste drum damage. The hazard severity levels associated with the resulting unmitigated consequences of the resulting release of radioactivity are as follows:

- Public: SL-4
- Facility Worker: SL-1
- Co-located Worker: SL-2.

The controls used to prevent/mitigate this event include developing a highly reliable crane and rigging system to reduce the frequency of drops. This system will be designed to reduce the frequency of drops such that risk goals with respect to the Co-located Worker and Public are met.

Additional protection to the worker will be provided by radiation monitors (area and continuous air monitors) which would notify operators of high activity in the event of a drop resulting in a breach of confinement. Workers are trained to evacuate upon actuation of radiation alarms.

The combination of controls (lifting integrity and radiation monitoring) are considered adequate to meet risk goals (probability of event and failure of controls is less 1E-06) for the facility worker.

An open issue related to this control strategy is the qualification of the cask; the cask design is still pending to determine what the drop height qualification will be.

It is the judgment of the ISM team that the identified controls are adequate to ensure that the resultant mitigated consequences will meet the applicable radiological exposure standards and that defense in depth will be achieved.

8. Toxic Release from LAW Melter Offgas

This event is initiated by offgas system faults or failures that result in loss of offgas flow or in offgas system leaks. These faults lead either to (1) overpressurization of the LAW Melter and release of radioactivity and toxic offgas into the melter enclosure, producing a release to occupied areas or (2) direct leakage of offgas to occupied areas. The hazards associated with the unmitigated consequences of this release are as follows:

- Public: Below Threshold (for chemical hazard)
- Facility Worker: Above Threshold
- Co-located Worker: Below Threshold.

Although the NOx hazard was recognized in the Part A HAR, it was not identified as a significant or bounding hazard; therefore, it has been included this ABAR.

The control strategy for this event consists of the following elements:

- Enclosure ventilation system
- Offgas system design (seismic category III)
- Stop melter feed
- Shutoff steam/air to the film cooler
- Shut off pressure control air

- Radiation detection and alarm.

It is the judgment of the ISM team that the identified controls are adequate to ensure that the resultant mitigated consequences will meet the applicable chemical exposure standards.

9. Overfill/Leak of LAW Feed Receipt Vessels

The Low Activity Waste (LAW) Feed Receipt system (PT-110) will utilize six new vessels with an effective capacity of 1.5 million gallons, which is sufficient to replace the 1.2 Mgal of storage previously provided by 241-AP-106. These vessels will be located in a vault adjacent to the Pretreatment Building. System PT-110 will also include the equipment required to return rejected LAW Feed to DOE, should the need arise.

Four vessels are primarily used for feed receipt. However, all six vessels will be equipped to be multi-functional, thus affording contingency space for overflow and to avoid emergency transfers to the Department of Energy (DOE) in the event of a vessel leak and to receive and lag store LAW feed arising from the High Level Waste (HLW) Pretreatment (System PT-220).

Overfilling or leaking of these in-cell vessels would have similar initiating event frequencies but potentially larger consequences due to the larger radioactive inventories associated with the new Feed Receipt Tanks; however, they are all bounded by the consequences of events in System PT210, the HLW Vessel Receipt Vessels.

It is the judgment of the ISM team that the identified controls are adequate to ensure that the resultant mitigated consequences will meet the applicable radiological exposure standards and that defense in depth will be achieved.

10. Changes to Major Radioactive Streams

The changes to the major radioactive streams reported in Rev. 0 of the Part A HAR reflect increased capacities of the HLW and LAW Feed Receipt Vessels, and the Sr/TRU Product Tanks, as well as new inventory due to the addition of the LAW Feed Receipt Vessels. It is the judgment of the ISM team that the identified controls related to these increased inventories are adequate to ensure that the resultant mitigated consequences will meet the applicable radiological exposure standards and that defense in depth will be achieved.